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GATEWAY, INC.
ATTN: Patent Attorney
610 GATEWAY DRIVE
MAIL DROP Y-04
N. SIOUX CITY, SD 57049

EXAMINER	
PATEL, HETUL B	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/763,734	BURNETT ET AL.	
	Examiner	Art Unit	
	Hetul Patel	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-13,16-19,21 and 23-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-13,16-19,21 and 23-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment and arguments filed on October 04, 2007. Claims 1, 7-10, 13 and 19 are amended; claims 23-26 are newly added; and claims 6, 14-15, 20 and 22 are cancelled. Therefore, claims 1-5, 7-13, 16-19, 21 and 23-26 are currently pending in the application.

2. Applicant's arguments filed on October 04, 2007 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4, 7, 11, 13, 16, 20 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Talluri (USPN: 2004/0153481).

As per claim 1, Talluri teaches a method of creating a virtual disk storage (i.e. the combination of shared storage capacity segments) construct using disk storage consolidated from at least two grid computers (i.e. nodes 1-n, 10 in Fig. 1) of a computing grid utilizing a connecting network (i.e. network 12 in Fig. 1), comprising:

locating an unused portion of disk storage space on a disk drive of each of the at least two grid computers (i.e. determining the percentage of unused storage capacity on a server group) connected by the connecting network of the computing grid; and presenting, as a single combined virtual storage drive on at least one computer (i.e. on a particular node when the data capacity of that node has been used), a portion of the unused portion of the disk storage space from the disk drive of each of the at least two grid computers (i.e. certain percentage of unused storage capacity on a server group) (e.g. see paragraph [0015] and Fig. 1). Furthermore, Talluri inherently does teach the claimed monitoring step by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider (e.g. see paragraph [0016]).

As per claim 2, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches that the method including allocating a portion of the total disk storage space on each of the at least two grid computers (i.e. certain percentage of unused storage capacity on nodes) to be made available as part of the virtual storage drive (i.e. the combination of shared storage capacity segments) (e.g. see paragraphs [0015]).

As per claim 3, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on each of the at least two grid computers (i.e.

nodes), the reserved portion of the disk drives being reserved for local use on the respective grid computer of the at least two grid computers (e.g. see paragraph [0015]).

As per claim 4, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about determining the total disk storage space on each of the at least two grid computers and allocating the total disk storage space (i.e. total or unused storage capacity) between a portion made available for use as part of the virtual storage drive (i.e. certain percentage of unused storage capacity made available to share with other resources/nodes) and a portion reserved for local use on the grid computers (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node) (e.g. see paragraph [0015]); wherein the portion available for use as part of the virtual storage space is of a fixed size (i.e. certain percentage) and the portion reserved for local use on the grid computer is of a fixed size (i.e. certain percentage) (e.g. see paragraph [0015]).

As per claim 7, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about allocating disk storage space on the at least one grid computer after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]).

As per claim 13, see arguments with respect to the rejection of claims 1-3. Claim 13 is also rejected based on the same rationale as the rejection of claims 1-3.

As per claim 16, see arguments with respect to the rejection of claim 1. Claim 16 is also rejected based on the same rationale as the rejection of claim 1.

As per claim 11, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches that the method additionally including loading an agent application (i.e. the policy) on each of the grid computers (i.e. in each node) for managing the portion of the unused portion of the total disk storage space on the grid computer made available to the virtual storage drive (e.g. see paragraphs [0015]-[0016]).

As per claim 20, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches that the step of reserving a portion of the total disk storage space includes restricting the reserved portion from inclusion in the single virtual storage presented (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraph [0015]).

As per claim 23, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about a portion of predetermined size of the total disk storage space includes restricting the reserved portion of predetermined size of the total disk storage space from being included in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on

the node and not made available to share with other resources/nodes) (e.g. see paragraph [0015]).

As per claims 24 and 25, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about monitoring at least one of the grid computers for activity indicating that a total of disk storage space on the at least one grid computer has been increased, wherein monitoring includes determining that a total disk storage space on the at least one grid computer has been increased by the addition of a disk drive (i.e. additional data storage resource) to the at least one grid computer (this feature is inherently taught by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider) (e.g. see paragraph [0016]).

As per claim 26, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about receiving on the one grid computer, from the local user of the one grid computer, designation of a minimum amount of free disk storage space to be maintained on the disk drive of the one grid computer (i.e. dedicating the percentage of the storage capacity solely for the use of a particular node by a policy managed by the service provider) (e.g. see paragraphs [0015]-[0016]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5, 7, 10-11, 13, 16, 18, 20 and 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talluri in view of Ebstyne et al. (USPN: 2002/0194340) hereinafter, Ebstyne.

As per claim 1, Ebstyne teaches a method of creating a virtual disk storage (i.e. the aggregated contiguous virtual data storage space) construct using disk storage consolidated from at least two grid computers (i.e. from PC hard drives from distributed network system) of a computing grid utilizing a connecting network (i.e. via network as shown in Fig. 1), comprising: locating an unused portion of disk storage space on a disk drive of each of the at least two grid computers (i.e. unused/additional hard drive space from the PCs on the distributed network system) connected by the connecting network of the computing grid; and presenting, as a single combined virtual storage drive on at least one computer (i.e. for any PC connected on the enterprise network), a portion of the unused portion (i.e. the unused/additional hard drive space from the PCs on the distributed network system) of the disk storage space from the disk drive of each of the at least two grid computers (i.e. the aggregated contiguous virtual data storage space made of plurality of PC hard drives on network) (e.g. see paragraphs [0025]-[0026] and [0030]-[0031] and Fig. 1).

However, Ebstyne does not disclose about monitoring at least one of the grid computers for activity indicating that additional disk storage space has been *added* to the at least one grid computer. Talluri, on the other hand, teaches the claimed

monitoring step by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider (e.g. see paragraph [0016]). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Talluri in the method taught by Ebstyne so whenever a new storage disk is added to a node, it can be detected and the portion of the unused space of the new storage disk can be added to the aggregated contiguous virtual data storage space for use by other nodes. Therefore, the new storage disk space can be used efficiently.

As per claim 2, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the method including allocating a portion of the total disk storage space on each of the at least two grid computers (i.e. the unused/additional hard drive space from the PCs on the distributed network system) to be made available as part of the virtual storage drive (i.e. the aggregated contiguous virtual data storage space) (e.g. see paragraphs [0025]-[0026]).

As per claim 3, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about reserving a portion of predetermined size of the total disk storage space (i.e. 15% of the PD's disk space) on each of the at least two grid computers (i.e. PCs on the network) (e.g. see paragraph [0031]), but does not specifically disclose that the reserved portion of the disk

drives being reserved for local use on the respective grid computer of the at least two grid computers. Talluri, however, discloses about reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on each of the at least two grid computers (i.e. nodes), the reserved portion of the disk drives being reserved for local use on the respective grid computer of the at least two grid computers (e.g. see paragraph [0015]).

As per claim 4, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about determining the total disk storage space on each of the at least two grid computers and allocating the total disk storage space (i.e. more than 1.5 petabytes) between a portion made available for use as part of the virtual storage drive (i.e. about 330 terabytes of additional/unused space) and leaving a portion of the total disk space as free (i.e. 15% of the disk space) (e.g. see paragraph [0031]); wherein the portion available for use as part of the virtual storage space is of a fixed size (i.e. 85% of the disk space) and the free portion is of a fixed size (i.e. 15% of the disk space) (e.g. see paragraph [0031]). However, Ebstyne does not specify that the free portion is reserved for local use on the grid computers. Talluri teaches this limitation by disclosing reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on each of the at least two grid computers (i.e. nodes), the reserved portion of the disk drives being

reserved for local use on the respective grid computer of the at least two grid computers (e.g. see paragraph [0015]).

As per claim 5, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about maintaining a table of grid computers contributing storage space to the virtual storage drive and corresponding amounts of storage space made available by each contributing grid computers (e.g. see paragraph [0067]).

As per claim 7, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about allocating disk storage space on the at least one grid computer after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]).

As per claim 13, see arguments with respect to the rejection of claims 1-3. Claim 13 is also rejected based on the same rationale as the rejection of claims 1-3.

As per claim 16, see arguments with respect to the rejection of claim 1. Claim 16 is also rejected based on the same rationale as the rejection of claim 1.

As per claim 23, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about a portion of predetermined size of the total disk storage space includes restricting the reserved portion of predetermined size of the total disk storage space from being included in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraph [0015]).

As per claims 24 and 25, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about monitoring at least one of the grid computers for activity indicating that a total of disk storage space on the at least one grid computer has been increased, wherein monitoring includes determining that a total disk storage space on the at least one grid computer has been increased by the addition of a disk drive (i.e. additional data storage resource) to the at least one grid computer (this feature is inherently taught by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider) (e.g. see paragraph [0016]).

As per claim 26, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about receiving on the one grid computer, from the local user of the one grid computer, designation of a minimum amount of free disk storage space to be maintained on the disk drive of the one grid computer (i.e. dedicating the percentage of the storage capacity solely for the

use of a particular node by a policy managed by the service provider) (e.g. see paragraphs [0015]-[0016]).

As per claims 10 and 18, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about providing a safe area on disk storage space of the virtual storage drive, the safe area being kept free of data (i.e. keeping 15% of the PC's disk space "free") (e.g. see paragraphs [0030]-[0031]). Although Ebstyne does not specify what the "free" disk space mean, i.e. not storing data at all; or reserving for local use, one ordinary skill in the art would believe that "free" disk space means the disk space that is "empty" of any data, as admitted by the Applicant in the response filed on 10/04/2007 (see page 13 of 17, 2nd paragraph).

As per claim 11, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the method additionally including loading an agent application (i.e. the client tier) on each of the grid computers (i.e. in each PC) for managing the portion of the unused portion of the total disk storage space on the grid computer made available to the virtual storage drive (e.g. see paragraphs [0047]).

As per claim 20, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the step of reserving a portion of the total disk storage space includes restricting the reserved portion from inclusion in the single virtual storage presented (i.e. 15% of the disk space is reserved from inclusion in the single virtual storage) (e.g. see paragraph [0031]).

As per claim 22, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the step of presenting includes presenting the single combined virtual storage drive to a user of the at least one grid computer (e.g. see paragraph [0058]).

5. Claims 8-9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Ebata et al. (USPN: 2004/0044698) hereinafter, Ebata.

As per claims 8 and 9, the combination of Ebstyne and Talluri teaches the claimed invention as described above. Talluri also discloses about reserving the predetermined minimum amount of disk storage space is set by the local user (i.e. the service provider) using an agent application (i.e. the policy) on the at least one grid computer; and receiving on one of the at least one grid computers, from a local user of the one grid computer (i.e. the service provider), designation of a predetermined minimum amount of disk storage space on the disk drive of the one grid computer to be reserved from inclusion in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraphs [0015]-[0016]).

However, both Ebstyne and Talluri failed to specifically teach the further limitations of (i) monitoring the one grid computer for activity indicating that the predetermined minimum amount of reserved disk storage space of the total disk storage

space on the one grid computer has not been maintained; and (ii) allocating disk storage space on the one grid computer for use by local applications after detecting activity indicating that the minimum amount of reserved disk storage space has not been maintained to restore at least the predetermined minimum amount of reserved disk storage space.

Ebata, on the other hand, teaches a method for moving files between storages across the network to rebalance the free disk space across the network. Ebata further teaches the step of monitoring at least one of the grid computers (i.e. at least one of the storage across the network) for activity indicating that a predetermined minimum amount (i.e. the threshold value) of free disk storage space of the total disk storage space on the grid computer has not been maintained (i.e. there is imbalance in available and minimum free disk space), wherein the predetermined minimum amount of free disk storage space is set using an agent application (i.e. an instruction from an administrator) on the at least one grid computer (i.e. the threshold value is set in the configuration information module (i.e. 180 in Fig. 1) of at least one grid computer (i.e. 8 in Fig. 1) (e.g. see paragraph [0045]); and (ii) allocating disk storage space on the at least one grid computer for use by local applications after detecting activity indicating that the minimum amount of free disk storage space has not been maintained to restore at least the minimum amount of free disk storage space (e.g. see the abstract). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the steps taught by Ebata in the method taught by the combination of Ebstyne and Talluri. In doing so, (i) a steady imbalance of

the free disk spaces among the network storages is prevented so that clients can always use the system and even if client writes large files and a maximum quantity of data can be written to disks managed by the virtualized network storage system; and (ii) during file migration between network storages, access requests from clients are not stopped while a file is being moved between network storages (e.g. see paragraphs [0015]-[0016]).

As per claim 17, see arguments with respect to the rejection of claim 8. Claim 17 is also rejected based on the same rationale as the rejection of claim 8.

6. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Wells et al. (USPN: 5,416,782) hereinafter, Wells.

As per claim 10, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches the claimed limitation as described above. Although Applicant admitted in the last response (as described above), just for sake of argument, if one ordinary skill in the art would not interpret/believe that "free" disk space means the disk space that is "empty" of any data, then Examiner would like to introduce the Wells prior art. Wells teaches about keeping a portion of the memory space free of data to allow the cleanup operation (e.g. see Col. 5, lines 1-6). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the step taught by Wells in the method taught by the combination of Ebstyne and Talluri. In doing so, data can be

temporarily stored at this safe area when (i) data needs to be transferred within the memory space; and (ii) the cleanup operation is required to run.

As per claim 18, see arguments with respect to the rejection of claim 10. Claim 18 is also rejected based on the same rationale as the rejection of claim 10.

7. Claims 12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Watkins et al. (USPN: 2002/0015336) hereinafter, Watkins.

As per claim 12, the combination of Ebstyne and Talluri teaches the claimed invention as described above, but does not teach the step of backing up data by copying data from a reserved portion of the disk storage space to the virtual storage drive. Watkins, however, discloses a step of copying data from a reserved portion (i.e. the second data storage areas, 509-511 in Fig. 5) of the disk storage space (i.e. 200-202 in Fig. 2) of at least one of the grid computers (i.e. 100-102 in Fig. 1) to an available portion of at least two other grid computers of the computing grid that have been made available to the virtual storage drive (i.e. the first data storage areas, 203-205 in Figs. 2 and 5) to thereby backup the copied data from the reserved portion of the at least one grid computer (e.g. see the abstract and Figs. 1-2 and 5). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Watkins in the method taught by the combination of Ebstyne and Talluri so in the event of failure of any one of the data storage devices,

data can be recovered from the second data storage areas of the other data storage devices.

As per claim 19, see arguments with respect to the rejection of claim 12. Claim 19 is also rejected based on the same rationale as the rejection of claim 12.

8. Claims 8-9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talluri, further in view of Ebata.

As per claims 8 and 9, Talluri teaches the claimed invention as described above. Talluri also discloses about reserving the predetermined minimum amount of disk storage space is set by the local user (i.e. the service provider) using an agent application (i.e. the policy) on the at least one grid computer; and receiving on one of the at least one grid computers, from a local user of the one grid computer (i.e. the service provider), designation of a predetermined minimum amount of disk storage space on the disk drive of the one grid computer to be reserved from inclusion in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraphs [0015]-[0016]).

However, Talluri failed to specifically teach the further limitations of (i) monitoring the one grid computer for activity indicating that the predetermined minimum amount of reserved disk storage space of the total disk storage space on the one grid computer has not been maintained; and (ii) allocating disk storage space on the one grid computer for use by local applications after detecting activity indicating that the

minimum amount of reserved disk storage space has not been maintained to restore at least the predetermined minimum amount of reserved disk storage space. Ebata, on the other hand, teaches a method for moving files between storages across the network to rebalance the free disk space across the network. Ebata further teaches the step of monitoring at least one of the grid computers (i.e. at least one of the storage across the network) for activity indicating that a predetermined minimum amount (i.e. the threshold value) of free disk storage space of the total disk storage space on the grid computer has not been maintained (i.e. there is imbalance in available and minimum free disk space), wherein the predetermined minimum amount of free disk storage space is set using an agent application (i.e. an instruction from an administrator) on the at least one grid computer (i.e. the threshold value is set in the configuration information module (i.e. 180 in Fig. 1) of at least one grid computer (i.e. 8 in Fig. 1) (e.g. see paragraph [0045]); and (ii) allocating disk storage space on the at least one grid computer for use by local applications after detecting activity indicating that the minimum amount of free disk storage space has not been maintained to restore at least the minimum amount of free disk storage space (e.g. see the abstract). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the steps taught by Ebata in the method taught by Talluri. In doing so, (i) a steady imbalance of the free disk spaces among the network storages is prevented so that clients can always use the system and even if client writes large files and a maximum quantity of data can be written to disks managed by the virtualized network storage system; and (ii) during file migration between network storages, access

requests from clients are not stopped while a file is being moved between network storages (e.g. see paragraphs [0015]-[0016]).

As per claim 17, see arguments with respect to the rejection of claim 8. Claim 17 is also rejected based on the same rationale as the rejection of claim 8.

9. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable Talluri in view of Wells.

As per claim 10, Talluri teaches the claimed invention as described above, but failed to teach about keeping a portion of the memory space free of data to allow the cleanup operation. Wells, however, teaches about keeping a portion of the memory space free of data to allow the cleanup operation (e.g. see Col. 5, lines 1-6). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the step taught by Wells in the method taught by Talluri. In doing so, data can be temporarily stored at this safe area when (i) data needs to be transferred within the memory space; and (ii) the cleanup operation is required to run.

As per claim 18, see arguments with respect to the rejection of claim 10. Claim 18 is also rejected based on the same rationale as the rejection of claim 10.

10. Claims 12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talluri in view of Watkins.

As per claim 12, Talluri teaches the claimed invention as described above, but does not teach the step of backing up data by copying data from a reserved portion of the disk storage space to the virtual storage drive. Watkins, however, discloses a step of copying data from a reserved portion (i.e. the second data storage areas, 509-511 in Fig. 5) of the disk storage space (i.e. 200-202 in Fig. 2) of at least one of the grid computers (i.e. 100-102 in Fig. 1) to an available portion of at least two other grid computers of the computing grid that have been made available to the virtual storage drive (i.e. the first data storage areas, 203-205 in Figs. 2 and 5) to thereby backup the copied data from the reserved portion of the at least one grid computer (e.g. see the abstract and Figs. 1-2 and 5). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Watkins in the method taught by Talluri so in the event of failure of any one of the data storage devices, data can be recovered from the second data storage areas of the other data storage devices.

As per claim 19, see arguments with respect to the rejection of claim 12. Claim 19 is also rejected based on the same rationale as the rejection of claim 12.

11. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Ebata and Watkins.

As per claim 21, Ebstyne teaches a method of creating a virtual disk storage (i.e. the aggregated contiguous virtual data storage space) construct using disk storage consolidated from at least two grid computers (i.e. from PC hard drives from distributed

network system) of a computing grid utilizing a connecting network (i.e. via network as shown in Fig. 1), comprising:

- locating an unused portion of disk storage space on a disk drive of each of the at least two grid computers (i.e. unused/additional hard drive space from the PCs on the distributed network system) connected by the connecting network of the computing grid; and presenting, as a single combined virtual storage drive on at least one computer (i.e. for any PC connected on the enterprise network), a portion of the unused portion (i.e. the unused/additional hard drive space from the PCs on the distributed network system) of the disk storage space from the disk drive of each of the at least two grid computers (i.e. the aggregated contiguous virtual data storage space made of plurality of PC hard drives on network) (e.g. see paragraphs [0025]-[0026] and [0030]-[0031] and Fig. 1);
- allocating a portion of the total disk storage space on each of the at least two grid computers (i.e. the unused/additional hard drive space from the PCs on the distributed network system) to be made available as part of the virtual storage drive (i.e. the aggregated contiguous virtual data storage space) (e.g. see paragraphs [0025]-[0026]);
- reserving a portion of predetermined size of the total disk storage space (i.e. 15% of the PD's disk space) on each of the at least two grid computers (i.e. PCs on the network) (e.g. see paragraph [0031]);

- determining the total disk storage space on each of the at least two grid computers and allocating the total disk storage space (i.e. more than 1.5 petabytes) between a portion made available for use as part of the virtual storage drive (i.e. about 330 terabytes of additional/unused space) and leaving a portion of the total disk space as free (i.e. 15% of the disk space) (e.g. see paragraph [0031]); wherein the portion available for use as part of the virtual storage space is of a fixed size (i.e. 85% of the disk space) and the free portion is of a fixed size (i.e. 15% of the disk space) (e.g. see paragraph [0031]);
- maintaining a table of grid computers contributing storage space to the virtual storage drive and corresponding amounts of storage space made available by each contributing grid computers (e.g. see paragraph [0067]);
- allocating disk storage space on the at least one grid computer after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]);

- loading an agent application (i.e. the client tier) on each of the grid computers (i.e. in each PC) for managing the portion of the unused portion of the total disk storage space on the grid computer made available to the virtual storage drive (e.g. see paragraphs [0047]); and
- providing a safe area on disk storage space of the virtual storage drive, the safe area being kept free of data (i.e. keeping 15% of the PC's disk space "free") (e.g. see paragraphs [0030]-[0031]). Although Ebstyne does not specify what the "free" disk space mean, i.e. not storing data at all; or reserving for local use, one ordinary skill in the art would believe that "free" disk space means the disk space that is "empty" of any data, as admitted by the Applicant in the response filed on 10/04/2007 (see page 13 of 17, 2nd paragraph).

However, Ebstyne does not disclose about monitoring at least one of the grid computers for activity indicating that additional disk storage space has been *added* to the at least one grid computer. Talluri, on the other hand, teaches the claimed monitoring step by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider (e.g. see paragraph [0016]). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Talluri in the method taught by Ebstyne so whenever a new storage disk is added to a node, it can be detected and the portion of the unused space

of the new storage disk can be added to the aggregated contiguous virtual data storage space for use by other nodes. Therefore, the new storage disk space can be used efficiently.

Ebstyne also failed to specifically disclose that (i) the reserved portion of the disk drives being reserved for local use on the respective grid computer of the at least two grid computers; and (ii) the free portion is reserved for local use on the grid computers. Talluri, however, discloses about reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on each of the at least two grid computers (i.e. nodes), the reserved portion of the disk drives being reserved for local use on the respective grid computer of the at least two grid computers (e.g. see paragraph [0015]).

Talluri also teaches about allocating disk storage space on the at least one grid computer after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]).

Both Ebstyne and Talluri failed to specifically teach the further limitations of (i) monitoring the one grid computer for activity indicating that the predetermined minimum amount of reserved disk storage space of the total disk storage space on the one grid

computer has not been maintained; and (ii) allocating disk storage space on the one grid computer for use by local applications after detecting activity indicating that the minimum amount of reserved disk storage space has not been maintained to restore at least the predetermined minimum amount of reserved disk storage space. Ebata, however, teaches a method for moving files between storages across the network to rebalance the free disk space across the network. Ebata further teaches the step of monitoring at least one of the grid computers (i.e. at least one of the storage across the network) for activity indicating that a predetermined minimum amount (i.e. the threshold value) of free disk storage space of the total disk storage space on the grid computer has not been maintained (i.e. there is imbalance in available and minimum free disk space), wherein the predetermined minimum amount of free disk storage space is set using an agent application (i.e. an instruction from an administrator) on the at least one grid computer (i.e. the threshold value is set in the configuration information module (i.e. 180 in Fig. 1) of at least one grid computer (i.e. 8 in Fig. 1) (e.g. see paragraph [0045]); and (ii) allocating disk storage space on the at least one grid computer for use by local applications after detecting activity indicating that the minimum amount of free disk storage space has not been maintained to restore at least the minimum amount of free disk storage space (e.g. see the abstract). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the steps taught by Ebata in the method taught by the combination of Ebstyne and Talluri. In doing so, (i) a steady imbalance of the free disk spaces among the network storages is prevented so that clients can always use the system and even if

client writes large files and a maximum quantity of data can be written to disks managed by the virtualized network storage system; and (ii) during file migration between network storages, access requests from clients are not stopped while a file is being moved between network storages (e.g. see paragraphs [0015]-[0016]).

None of Ebstyne, Talluri and Ebata teaches the step of backing up data by copying data from a reserved portion of the disk storage space to the virtual storage drive. Watkins, however, discloses a step of copying data from a reserved portion (i.e. the second data storage areas, 509-511 in Fig. 5) of the disk storage space (i.e. 200-202 in Fig. 2) of at least one of the grid computers (i.e. 100-102 in Fig. 1) to an available portion of at least two other grid computers of the computing grid that have been made available to the virtual storage drive (i.e. the first data storage areas, 203-205 in Figs. 2 and 5) to thereby backup the copied data from the reserved portion of the at least one grid computer (e.g. see the abstract and Figs. 1-2 and 5). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Watkins in the method taught by the combination of Ebstyne, Talluri and Ebata so in the event of failure of any one of the data storage devices, data can be recovered from the second data storage areas of the other data storage devices.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hetul Patel whose telephone number is 571-272-4184. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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HBP

MATTHEW KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100